Response to Reviewer 2

Overall, this is a well-structured and policy-relevant paper that addresses a timely and important topic: the role of digitalization in improving double-factor allocation efficiency (traditional production and R&D factors) in China's manufacturing industry and its consequential impact on carbon emissions. The paper employs a novel approach by using WIOD input-output tables to measure the digital transformation at a sectoral level, integrates this with a double-factor mismatch model, and constructs an elegant empirical identification strategy to assess the mediation effect on carbon emissions.

The novelty of this manuscript lies in its unified analytical framework that integrates three components, digitalization, factor allocation efficiency, and carbon emissions, into one model. This triple-pathway mechanism has not been sufficiently explored in previous literature, particularly with the precision of the WIOD-based input metrics and sub-sectoral Chinese manufacturing data. The authors' introduction of R&D factor mismatches, in addition to production factors, adds clear value to the literature. This comprehensive view represents a significant contribution to sustainability studies, particularly those examining structural and technological drivers of decarbonization in emerging economies.

However, a few important revisions should be addressed to enhance clarity and rigor:

1. First, the similarity index of 42% is unacceptably high for journal submission and must be reduced. Much of this likely stem from boilerplate descriptions of models and literature; nevertheless, the authors must rephrase these sections substantially in their own words, especially the theoretical framework and empirical methods, even when citing prior work. Editors and reviewers will treat this issue seriously, and it could jeopardize the paper’s publication chances.

   Reply:

   Thank you for the suggestions from the reviewing experts. The author has made adjustments to the article's similarity rate.

2. Second, while the empirical identification is generally sound and the authors attempt to handle endogeneity through IV-2SLS and GMM approaches, a more detailed justification of instrument validity is warranted. The use of lagged digitalization indicators is reasonable but needs further explanation regarding exclusion restrictions; why are they assumed to affect mismatch only through current digitalization? A robustness check with an alternative instrument (e.g., regional broadband penetration rates or digital

infrastructure policies) would strengthen the claim.

Reply:

Thank you for the suggestions from the reviewing experts. As the data used by the author is industry level panel data, it is currently not possible to use a policy event symbolizing digital transformation as a quasi natural experiment for research. Therefore, the author will supplement the limitations and future prospects of this study by highlighting the shortcomings of this research. The author has added references from the past three years and addressed the issue of article duplication

3. Third, the factor mismatch measures are based on a well-referenced CES production function model; however, it remains unclear how sensitive these measures are to assumptions on parameters like σ (substitution elasticity) or α (output elasticity of capital). A sensitivity analysis around these parameter values would significantly improve robustness and credibility.

Reply:

Thank you for the expert review's comments. Based on the expert opinions, the author has provided an explanation of the limitations in the research section of this article, as follows:

Due to factors such as the timeliness and availability of data, the limitations of this study mainly lie in the following aspects: (1) Due to the selection of double-digit industry panel data from China's manufacturing industry for empirical testing, there are relatively few endogeneity processing methods available. And the data year is relatively outdated, mainly due to the fact that the WIOD database data is only up to 2014. In future research, the author will strive to collect data on manufacturing industry segmentation in various provinces of China. If the frequency of publishing input-output table data between industries in China is increased to once a year, it is expected to use updated years and richer "provincial industry" data for empirical research. (2) In the quantitative evaluation model of factor allocation efficiency used in this article, sensitivity and robustness tests were not conducted on the selection of parameters such as the output elasticity coefficients of capital and labor, as well as the output substitution elasticity between industries. This is mainly due to the fact that the model is already a very mature mathematical model, and a large number of existing literature have been applied, which confirms that the model has strong reliability, scientificity, and robustness. However, in the future, the parameter selection and model setting of the model can still be modified and improved based on the research question

and the selection of empirical objectives.

4. Fourth, the policy implications are thoughtful but could be expanded. Given the heterogeneity across state-owned and non-state enterprises noted in the findings, the authors should more clearly articulate targeted recommendations for SOEs, especially given their dominance in heavy-emitting industries.

   Reply:

   Thank you for the suggestions from the reviewers. The author fully agrees with their suggestions. Therefore, the author revised the suggestions for state-owned manufacturing enterprises and made them more practical and informative. Specifically, as follows:

   Especially for state-owned enterprises, due to the incomplete marketization of the flow and allocation of production factors in China's state-owned enterprise sector, the digital transformation of state-owned manufacturing enterprises cannot affect their factor allocation efficiency, and thus cannot have a positive effect on their carbon emissions reduction. Therefore, it is suggested that state-owned enterprise departments must strengthen market-oriented reforms and promote the free and dynamic replacement and flow of internal factors.